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Using Independence Training to Teach Independent Living Skills to Visually Impaired Children and Youth.

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USING INDEPENDENCE TRAINING TO TEACH INDEPENDENT LIVING SKILLS TO VISUALLY IMPAIRED CHILDREN AND YOUTH

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ABSTRACT

Two groups of students with visual impairments were taught various independent living skills. Five of the seven students also had a diagnosis of mental retardation. One group (three first graders) was taught the tasks of folding a shirt, making an emergency telephone call, and spreading soft foods with a knife. The other group (four young men) was taught to increase leisure skills through three different leatherwork tasks. Independence training was conducted in a group format, and included social learning components (e.g., self-evaluation, peer evaluation and reinforcement) in addition to traditional operant procedures (e.g., modeling, prompting). However, due to the presence of visual impairments, a physical and verbal modification of modeling was utilized, whereby the subject was physically guided through the steps while being provided with a narration of the steps simultaneously. A multiple baseline design across behaviors demonstrated the efficacy of the comprehensive training package in training various independent living skills to the two groups of visually impaired and mentally retarded students. Social validity measures demonstrated the clinical significance of the subsequent changes in behavioral skills. The current positive results show that training procedures used exclusively with persons with mental retardation can be modified and be effective with a different and younger population, while targeting different independent living skills.

INTRODUCTION

Visual Impairments

A visual impairment is usually thought of as an isolated disability, in that only the sense of vision is lost. However, the absence or severe impairment of vision, especially if present from birth, has profound effects on every area of the individual's development and learning (Orlansky, 1988; Warren, 1981). Areas frequently targeted for intervention include: (a) social skills, (b) maladaptive behaviors (e.g., stereotypies, self-injury, disruptiveness), (c) academic skills, and (d) adaptive living skills (Van Hasselt, 1983). Of these areas, the majority of empirical studies conducted with visually impaired individuals have concentrated on behavioral excesses (e.g., stereotypies, self-injury), rather than behavioral deficits (e.g., independent living skills) (Van Hasselt, 1983).

The apparent lack of studies targeting behavioral deficits, such as independent living skills, of visually impaired persons is surprising, especially when given that many visually impaired individuals do not attain the prerequisite skills necessary for independent living (Van Hasselt, Ammerman, & Sisson, 1988). One reason for this severe deficit and the specific need for independent living skills training is that without vision, these individuals are unable to acquire these skills through observing others (i.e., incidental learning). In contrast, sighted individuals learn much from observing others as they perform these particular behaviors. For instance, unless a visually impaired child is actively taught what a telephone is, skill acquisition may not occur because, (s)he does not see it being used. Consequently, many visually impaired individuals are deficient in independent living skills (Van Hasselt & Sisson, 1987), and may require direct training to compensate for the loss of naturalistic observation (Van Hasselt, 1983).

In addition to its influence on acquisition of independent living skills, lack of vision affects other aspects of a person's development, learning, and behavior. Warren (1981) discussed three categories of variables which determine how much influence a visual impairment will have over these areas. The first category is the effects of other concurrent disabilities (e.g., mental retardation, hearing impairment, cerebral palsy), ranging from mild to severe. This factor should be a common consideration, since a high rate of multiple impairments exists within the visually impaired population (Oriansky, 1988). The second grouping consists of variables related to the visual impairment itself, such as degree of impairment, degree of residual vision, etiology, age of onset, course of onset (e.g., sudden or gradually progressive), and present eye condition. The third influential category contains the circumstances of the visually impaired child's environment, which includes the physical setting, characteristics of the sensory, learning (e.g., reinforcement patterns) and linguistic environments, and the social setting and all its interpersonal interactions, family size, and the behaviorai patterns of significant others.

The visually impaired child is likely to exhibit delays of a few months to several years, because it is more difficult for him/her to acquire concepts and experiences than that of his/her sighted peers (Buell, 1973). For example, impaired vision affects perceptual development, not only by restricting visual sources of information, but also by inhibiting the organization of auditory and tactual events in the environment (Warren, 1981). In effect, vision functions as a discontinuous and inaccurate source of information (Van Hasselt & Sisson, 1987). Likewise, spatial development of visually impaired individuals deviates from that of sighted individuals, because vision is fundamental to learning concepts of structure of physical space and spatial relationships (Van Hasselt & Sisson, 1987; Warren,

1981). For example, topics such as, space, direction, similarities, and differences are very difficult to learn (Scott, Jan, & Freeman, 1977).

The loss, or severe impairment, of vision also affects conceptual development, in that without vision, identification of people, objects and events, and object constancy are more difficult to attain (Van Hasselt & Sisson, 1987; Warren, 1981). This lack of an important source of information on the visually impaired child's cognitive development is evident by the middle of the second year of life when serious cognitive delays are usually present (Warren, 1981).

Of all the developmental areas, visually impaired children experience the greatest delays in functional hand usage (e.g., fingering, grasping, transferring objects) (Van Hasselt & Sisson, 1987). This finding is significant when one considers that visually impaired individuals depend heavily on tactile means for information (e.g., reading Braille).

Visually impaired children also experience delays in gross motor development, which have been attributed to the blind infant's lack of motivation to reach out, to crawl toward objects, and to explore the environment, and his/her inability to learn certain behaviors (e.g., walking) through imitation (Fraiberg, 1977; Van Hasselt & Sisson, 1987). The result is a restriction in the visually impaired child's mobility. Further, poor posture often associated with visually impaired persons also contributes to mobility difficulties because vertical perception of one's body is inadequate, which removes the stable correspondence between body and environment (Warren, 1981).

Several different dimensions of social development are affected by a visual impairment (Warren, 1981). First, loss of vision early in life hinders the identification and discrimination of specific people. In addition, because vision provides continuous distal information about the presence of significant persons, lack

of vision may prolong separation anxiety and promote a sense of insecurity, and a subsequent decreased willingness to explore one's environment (Van Hasselt & Sisson, 1987; Warren, 1981). Vision also plays an important role in interpersonal interactions. For example, the role of vision is important in maintaining infants' smiling, eye contact, development of nonverbal communication (Warren, 1981), and providing environmental feedback concerning performance in interpersonal interactions (Van Hasselt & Sisson, 1987). In particular, the lack of eye contact and smiling also adversely affects the behavior of the caregiver.

Definitions

The degree of visual impairment is usually described in terms of visual acuity and visual efficiency, which in turn determines classification. These terms will be defined next in order to provide information on how much influence a visual impairment may have on development and learning.

Visual acuity. Visual acuity describes how well the eye sees under controlled circumstances (i.e., set distances) (Scott et al., 1977). For example, if a person's visual acuity was 20/200, then that person would see at 20 feet what persons with normal vision see at 200 feet. Below the visual acuity of 20/400, vision is usually measured by the distance at which one is able to count fingers (e.g., C.F. @ 5', or count fingers at five feet) (Scott et al., 1977). If a person has light perception, then they are aware of light and shadows only.

Visual efficiency. Visual functioning, or efficiency, refers to how the person utilizes the vision (s)he has (Scott et al., 1977). Two persons may both have a visual acuity of 20/200, but they may function quite differently, depending upon how they use their residual vision. Whereas visual acuity tends to be constant, visual efficiency can improve (Scott et al., 1977).

Classifications

Visually impaired individuals comprise a very heterogeneous group, and include individuals with varying degrees of visual impairment. The classification of visual impairments includes two major groups: blind, and partially sighted or low vision. For legal and administrative purposes, blind refers to having a best corrected visual acuity in the better eye of less than 20/200, or a restricted field of vision whose diameter is 20 degrees or less (Batshaw & Perret, 1986; Scholl, 1983). Therefore, some persons who are classified as legally blind may still have some useful vision. Partially sighted refers to persons whose best corrected visual acuity in the better eye is between 20/70 and 20/200 (Bueli, 1973; Scholl, 1983). In addition, visual Impairments have been categorized using functional definitions, which emphasize how the person utilizes his/her residual vision and its impact on reading (Kirk & Gallagher, 1983). Toward that end, a person is considered blind if (s)he has no vlsion or only light perception, and must iearn through Braille and related aids (Barraga, 1983). Persons wlth low vision are described as having significant limitations in distance vision. They need to get very close (e.g., few inches to two feet) to objects in order to see them clearly (Barraga, 1983; Scholl, 1983), and for educational purposes, they learn through print, which may include large print, or use of magnifiers (Buell, 1973).

From a teaching standpoint, visual impairment refers to a problem with vision that, even after corrective measures, adversely affects an individual's educational progress and requires further adaptive measures (Matson & LaGrow, 1983). Therefore, although many individuals may have visual problems (e.g., myopia, hypermetropia, astigmatism), the majority of these can be corrected with lenses, and as a result, do not interfere with educational performance.

In addition to degree of impairment and degree of residual vision, the eye condition and etiology of the visual impairment also determine how much impact the visual impairment will have on an individual's development and ability to learn. Some common eye conditions and etiological factors will be discussed in the foliowing sections.

Eye Conditions

The heterogeneity of visual impairments arises, in part, from the numerous parts of the eye that can be affected. For example, visual impairments may be the result of impaired functioning of the iens, vitreous humor, retina, optic nerve, or the occipital lobe of the brain.

Retinopathy of prematurity. Retinopathy of prematurity (ROP), formally known as retrolental fibroplasia (RLF), is caused by the exposure of premature infants to high oxygen concentrations (Batshaw & Perret, 1986; Orlansky, 1988; Scott et al., 1977). The high level of oxygen destroys the blood vessels that supply the retina, producing vision loss. Small areas of the retina may be left intact. How functionai is any resultant vision, will depend on the size and location of the intact areas. This condition was more common in the 1940s and 1950s, and accounted for more than half of the visual impairments at that time (Kirk & Gallagher, 1983).

Congenital cataracts. A cataract occurs when the lens of the eye becomes cloudy, or opaque, which gives the pupil the appearance of being grayish white (Scott et al., 1977). The resultant cloudiness interferes with the ability of the lens to focus light rays on the retina. If the lens is very opaque, then light rays will not be able to pass through, and the lens must be removed. in the case of lens removal, the Individual is fitted with an artificial lens (i.e., contact lens or spectacles). Congenital cataracts sometimes are the result of hereditary factors, or they can arise from prenatal events, such as maternal rubella. In general, the vision of children

with congenital cataracts, especially if the result of rubella, is severely impaired, even with artificial lenses.

Congenital glaucoma. Glaucoma is a genetic eye condition, characterized by increased pressure within the eye (Scott et al., 1977). The abnormal pressure results when the vitreous fluid, which fills the eye, is manufactured, but is not discharged. If the pressure becomes too great, then the blood vessels of the retina are squeezed, which stops blood flow to the retinal cells, which then die. If the pressure is not relieved, the cells of the retina start to die, beginning at the periphery and moving toward the center, until complete vision in that eye is lost. Increased pressure can be alleviated through surgery.

Optic nerve atrophy. Optic nerve atrophy refers to the loss of functioning of the optic nerve, which carries the visual signals from the retina to the brain (Scott et al., 1977). Optic nerve atrophy can occur when the nerve fibers do not develop, or when they are destroyed as a result of disease, injury, tumor, etc. The presence, amount, or quality of any resultant vision will depend upon the number of optic nerve fibers destroyed, and their location. This condition is usually present at birth, and does not worsen.

Etiological Factors

Different etiological factors, which can affect different aspects of a child's vision (e.g., visual acuity, visual field, color vision, ability of both eyes to function together) (Orlansky, 1988), and degree of impairment, contribute to the heterogeneity of this disorder.

Prenatal factors. Common prenatal causes of congenital blindness and severe visual impairment include hereditary factors (e.g., congenital cataracts, albinism), viral infections (e.g., rubella, meningitis), fetal exposure to harmful agents,

trauma, and eye malformations (Orlansky, 1988). Some factors, such as rubella, are likely to produce multiple impairments (e.g., hearing loss, cerebral palsy).

Postnatal factors. Common postnatal causes of visual impairments include: retinopathy of prematurity (ROP), diseases (e.g., diabetes, syphilis, glaucoma), poisonings, tumors, and accidents, injuries, or trauma (Buell, 1973; Kirk & Gallagher, 1983). However, hereditary factors are more common causes of visual impairments than are accidents and diseases (Kirk & Gaiiagher, 1983). In general, postnatal etiological factors tend to produce isolatlve impairment, in that vision is the oniy neurological system affected. On the other hand, prenatal causes tend to produce more diffuse effects (i.e., multiple impairments), which is not surprising given the simultaneous development of numerous neurological systems in the fetus.

Prevalence and Incidence

Various etiological factors contribute to the incidence and prevalence rates of blindness and visual impairment. Nevertheless, the following three findings are generally accepted:

(1) The prevalence rate of blindness and visual impairment is higher for adults than for children, with approximately half of the legally blind persons in the United States being over the age of 65 (Orlansky, 1988). This fact is not surprising when one considers that a positive correlation exists between many etiological factors of visual impairments (e.g., diabetes, cataracts, glaucoma) and advancing age (Jose, 1983).

(2) Blindness and visual impairment have a low incidence in infants and children, even when compared to other handicaps (Orlansky, 1988). Incidence rates for blindness have ranged from that of about 0.4 in 1000 (Batshaw & Perret, 1986) to 1 in 1000 (Kirk & Gallagher, 1983), or approximately 37,000 children in the United States (Van Hasselt & Sisson, 1987). Conversely, the rate of visual

impairment is much higher (30%) for children with multiple handicaps whose primary diagnosis was not a visual impairment (Schor, 1984).

(3) There are more visually impaired children with some useful residual vision, than those who are completely blind, with approximately 70%-80% of visually impaired school-aged children have some residual vision (Orlansky, 1988).

Educational Settings

The setting where a visually Impaired student will be educated depends on the degree of visual impairment and the presence of any other handicapping conditions. Presently, the majority (over 70%) of visually impaired students are educated in public schools, while the remainder attend residential schools for the visually impaired (Cartwright, Cartwright, & Ward, 1985; Kirk & Gallagher, 1983). However, initially, visually impaired students were educated solely in residential facilities. Residential programs for visually impaired children began in 1829 (Perkins School for the Blind, Massachusetts), whereas public schools did not offer formal classes for visually impaired students until 1900 (in Chicago) (Buell, 1973; Cartwright et al., 1985; Kirk & Gallagher, 1983).

In the public school system, visually impaired students are educated in one of three ways: (1) They may attend self-contained classrooms; (2) they may spend part of their day in resource rooms, where they receive special instruction, while the rest of the day is spent in a normal classroom; or (3) itinerant teachers may visit their school and work individually with the visually impaired students on a scheduled basis (Buell, 1973; Cartwright et al., 1985).

The need for research with visually impaired individuals, particularly on educational and psychological tasks is urgently needed. Therefore this group will be studied here. Children and young adults with visual impairments will participate and were chosen because they have not received the necessary research to assist them in

developing the adaptive behavior skills required for independent living, or placement in less restrictive settings.

Independent Living Skills

Independent living skills, activities of daily living, or adaptive behavior may be defined as behaviors that allow an individual to care independently for his/her own needs. These self-help skills range from the most basic, such as toileting, to more complex skills, such as grocery shopping. The ability to care for oneself enables the handicapped individual to meet basic requirements for independence and normalcy, which are generally viewed as among the most important goals for handicapped individuals (Matson, 1990).

Thus, acquiring independent living skills is important in the lives of persons with various impairments, and has become a priority in many training programs for several reasons. First, the lack of Independent living skills usually precludes the client from securing placement in a less restrictive setting. Many group homes, respite care agencies, and workshops will not accept clients who cannot care for their own basic needs. Thus, most clients who are dependent upon others for their self-care usually reside in more restrictive institutions and residential programs.

These concepts of least restrictive placement and normalized living conditions are part of the normalization and deinstitutionalization process (Nihira & Nihira, 1975). Deinstitutionalization refers to placing mentally and physically disabled individuals who are capable of living in a less restrictive environment, outside of public institutions (Willer & Intagliata, 1984). Deinstitutionalization is founded upon the principle of normalization (Willer & Intagliata, 1984). Wolfensberger (1972) defines normalization as the "utilization of means which are as culturally normative as possible, in order to establish and/or maintain personal behaviors and characteristics which are as culturally normative as possible" (p. 28).

From the deinstitutionalization and normalization movement, various litigation and legislation have arisen. For example, community placement issues have been addressed by the landmark case of *Wyatt vs. Stickney*, and other court cases. Specifically, Alabama's *Wyatt vs. Stickney* legislation dictated that no individual with mild handicaps shall live in an institution unless it was the least restrictive setting for that individual, and that institutionalized individuals have a right to an appropriate education in that setting. Similarly, one of the provisions of Public Law 94-142 (Education for All Handicapped Children Act of 1975) requires that handicapped individuals be educated in the least restrictive setting. Therefore, it is in accordance with this federal law that developmentally and physically disabled individuals be taught the skills and behaviors necessary for placement in less restrictive settings.

Secondly, remediation of deficits in independent living is important because adaptive behavior deficits are one defining characteristic of mental retardation (Grossman, 1983). Although deficits in adaptive behavior do not operationally define visual impairments, the lack of independent living skills affect placement, and if acquisition of adaptive behavior is significantly delayed, then these deficits may also become criteria for a concurrent diagnosis of mental retardation (Grossman, 1983).

The third reason stresses that clients without independent living skills require an enormous amount of caregiver time, creating a severe drain on staff resources (Levine & Elliott, 1970) and supportive services, such as laundry service (Dayan, 1964). Once these skills are acquired, caregivers could redirect time and effort once devoted to basic living skills to education and further training of the clients.

A fourth reason for training independent living skills is that lack of such skills may promote health-related problems associated with poor personal hygiene and

incontinence. Tooth decay, skin irritation, and urinary tract infections are some of these problems (Barmann, Katz, O'Brien, & Beauchamp, 1981).

Fifth and finally, if the client is not able to care for his/her own needs, and emits odors due to incontinence and poor personal hygiene, (s)he may experience social isolation and ostracism (Bender & Valletutti, 1985). For the above mentioned and other reasons, independent living skills acquisition is important.

In recognizing the importance of independent living skills, an abundance of behaviorally oriented research evaluating and developing new techniques of teaching these skills has been conducted over the last 25 years. In the early 1960s, the first self-help skills studies were conducted with mentally retarded adults residing in state institutions (Keogh & Whitman, 1983; Matson & LaGrow, 1983; Watson & Uzzell, 1980). In particular, Ellis (1963), Dayan (1964), and Bensberg, Colwell, and Cassel (1965) published reports describing the use of operant conditioning procedures (e.g., reinforcement, shaping) to train appropriate toileting in mentally retarded residents from the Pinecrest State School in Louisiana. Additional early practical applications of behavior modification techniques (e.g., token economy, backward chaining) to train self-help skills (e.g., self-feeding, grooming) to mentally retarded persons came out of the Parsons State School in Kansas (Girardeau & Spradlin, 1964; Gorton & Hollis, 1965). Although these early studies were methodologically inadequate, they helped promote an interest in skill acquisition in developmentally disabled persons. For this reason, they were very significant.

Even though behavior modification procedures have been applied to individuals with various developmental and physical disabilities, most research conducted on independent living skills has continued to be conducted with persons with mental retardation (Matson, 1990). This situation may be because among disabilities, mental retardation comprises the largest subgroup, thereby providing the largest

subject pool. Conversely, although visually impaired individuals share many independent living skills deficits with mentally retarded persons, not much research has been conducted utilizing visually impaired individuals (Van Hasselt, 1983). One reason for the sparsity of research conducted with visually impaired persons may be the lower incidence of this population as compared to mental retardation. Secondly, as a diagnostic category, visual impairments are not defined by overt behavior, as is mental retardation (i.e., deficits in adaptive behavior), but are defined by the loss of a physical function. Therefore, behavior modification techniques were not utilized with this population until much later (Matson & LaGrow, 1983). Thirdly, in the past, visually impaired persons were trained primarily by special educators who typically lacked training in clinical research and experimental design necessary for empirical evaluation of training procedures (Van Hasselt, 1987). Lastly, this low rate of independent living skills research conducted with the visually impaired may be due to the difficulties involved in communicating and using standard teaching strategies (e.g., modeling) with these children.

Teaching Specific Independent Living Skills

Operant techniques which will be described in the next section, have been used to teach various independent living skills to developmentally and physically disabled persons. in particular, the largest amounts of research have been conducted on the training of self-feeding (Albin, 1977; Azrin & Armstrong, 1973; Butterfield & Parson, 1973; Matson, Ollendick, & Adkins, 1980; Nelson, Cone, & Hanson, 1975; O'Brien & Azrin, 1972; O'Brien, Bugle, & Azrin, 1972), and toileting skills (Azrin & Foxx, 1971; Azrin, Sneed, & Foxx, 1973; Foxx & Azrin, 1974) in mentally retarded persons. With regards to visually impaired persons, independent living skills training has concentrated mainly on independent feeding, toileting, mobility,

and emergency safety skills (Van Hasselt, 1983; Van Hasselt, 1987; Van Hasselt et al., 1988).

Even though basic skills such as, feeding and toileting are important, they have received a disproportionate amount of research. This point becomes more poignant when one considers that these basic skills usually are targeted for severely and profoundly handicapped individuals, whereas the majority of the developmentally disabled population are mildly handicapped (e.g., 75% to 80% of all mentally retarded persons fall in the mild range). For the higher functioning disabled individuals, more research needs to be conducted on the training of independent living and domestic skills, because these skills are necessary in order to gain community independence.

Domestic Skills

Domestic skills have been defined as skills performed within the home environment. They are not related to job or community skills that occur outside the home (e.g., bus riding, shopping) (Wehman, Renzaglia, & Bates, 1985). Clothing care is considered a domestic skill, because even though it is sometimes performed outside the home (i.e., at a Laundromat), when resources permit, it is a skill that usually is limited to the home.

The two domestic skills targeted in the present study are folding a shirt, and spreading. However, due to the lack of adequate studies that also targeted these specific skills, the general research on clothing care, and utensil use will be reviewed briefly.

Clothing care. Teaching clothing care is a relatively new area in independent living skills, in that before the move toward deinstitutionalization, all clothing needs were the responsibility of institutional staff. Consequently, the ability to care for one's own clothing is a basic skill that many developmentally disabled and visually impaired persons may not have in their repertoires. Recent attempts to teach clothing care have been limited to mentally retarded persons and include laundry (e.g., sorting

clothes, operating a soap dispenser, washer, and dryer) (Cuvo, Jacobi, & Sipko, 1981; McDonnell & McFarland, 1988), mending (i.e., buttons, seams, hems) (Cronin & Cuvo, 1979), and clothing selection (Nutter & Reid, 1978). Only one study was found that addressed folding clothes (i.e., a shirt with buttons), and its purpose was to compare different prompting sequences on three different tasks (e.g., folding a shirt, setting a table, playing a cassette) (Walls, Crist, Sienicki, & Grant, 1981). As a result, minimal information (i.e., task analysis) was provided about the specific tasks. The study concluded that mildly mentally retarded persons acquired the three independent living skills faster and with fewer errors, than moderately mentally retarded individuals, with no difference in prompting sequences (i.e., least-to-most, most-to-least hierarchies).

Utensil use. An advanced self-feeding skill often given low training priority is correct utensil usage. When a client first learns to feed himself/herself, a spoon is usually considered appropriate for all foods (O'Brien et al., 1972). However, once a client has become skilled in the use of a spoon, forks and knives should be introduced. Studies targeting correct utensil use have been conducted largely with mentally retarded adults, with physical guidance as a critical training component (Matson, Ollendick, & Adkins, 1980; Nelson et al., 1975; O'Brien & Azrin, 1972). Correct use typically has been defined by the grip, and the type of food for which the utensil was used. For example, if a client held a fork correctly, but used it to eat jello, then the entire response would be considered incorrect even though the grip was appropriate. Similarly, if the client used a spoon to eat jello, but held the spoon in an inappropriate manner, then the entire response would be incorrect. In a study that taught correct utensil use to a blind, multihandicapped girl, the dependent measure was more broadly defined as the percent of mouthfuls of food taken with a utensil (spoon or fork) (Sisson & Dixon, 1986). In general, training in the appropriate use

of a knife has been limited to cutting with little or no consideration given to the skill of spreading. However, spreading was included in one study, as a small part of a summer curriculum package for visually impaired adolescents and was taught through snack and sandwich preparation (Stewart, Van Hasselt, Simon, & Thompson, 1985). No additional information regarding treatment procedures, or skill acquisition data was provided.

Emergency Safety Skills

Emergency safety skills include behaviors such as accident prevention, basic first-aid, fire evacuation, and emergency telephone calls. These skills should be given a high training priority with visually impaired persons who may be at increased risk due to their inability to use visual cues and their difficulty with mobility (Van Hasselt, 1983, 1987). Due to the reasons noted above, most research on emergency skill training with visually impaired persons has centered on fire evacuation procedures. Visually impaired children have been trained in this skill through utilization of different simulated fire emergency situations with daytime and nighttime drills (Jones, Sisson, & Van Hasselt, 1984; Jones, Van Hasselt, & Sisson, 1984). Holburn and Dougher (1985) used positive (i.e., praise) and negative (i.e., alarm stopped when the exit door was opened) reinforcement in a game format to train a severely mentally retarded blind client to leave his unit when the fire alarm sounded.

Another emergency safety skill that is of equal importance to fire evacuation is the ability to make emergency telephone calls. For instance, if one is unable to escape a fire, if others are in danger, or if after a successful escape the fire still needs to be extinguished, then emergency assistance needs to be summoned. The present study targeted emergency telephone calls (i.e., calling "911") in response to fires, and a variety of other emergencies (e.g., drowning, seizures, falls, choking, etc.).

Emergency telephone calls. In order to use the telephone to call for assistance in an emergency situation, the individual must have certain prerequisite skills, such as the ability to locate emergency phone numbers, dial the number, and relay information (e.g., type of emergency, location). Several studies have addressed the training of these prerequisite skills. For example, Leff (1974, 1975) used a specially constructed color-coded dial disc and a picture telephone number slide to teach mentally retarded children and adults to dial a telephone. Each number on the dial had a different color associated with it, and the color-coded phone number slide was placed beneath a "window", so that only one number at a time was visible.

Disabled individuals who have acquired the skill of dialing a telephone have been given advanced training in using different types of telephones (e.g., public telephone) (Test, Spooner, Keul, & Grossi, 1990), and in telephone conversational skills so that they learn to obtain and provide information over the phone (Horner, Williams, & Steveley, 1987; Matson, 1982; Smith & Meyers, 1979).

Risley and Cuvo (1980) put all the prerequisite skills together and trained three mildly to moderately mentally retarded adults to make emergency telephone calls to three different emergency personnel: firefighter, police officer, and doctor. Using a least-to-most hierarchy of prompts (i.e., verbal instructions, verbal instruction + modeling, verbal instruction + physical guidance), Risley and Cuvo (1980) trained the following four subgoals: (a) deciding who to call, (b) finding the telephone number of the appropriate party in a modified telephone directory, (c) dialing that number, and (d) providing all relevant and necessary information to the emergency party. At the end of training, all three subjects could correctly complete the four subgoals.

Leisure Skills

Leisure skills are defined as activities in which the individual participates during his/her free time (Wehman et al., 1985). However, many developmentally and physically disabled persons do not make efficient use of their free time. Any participation in leisure activities usually is a group structured activity. In many institutions and residential facilities, leisure activities are dictated by the staff. Thus, unless the client receives systematic instruction in leisure activities, (s)he will have a great deal of unoccupied time. This point is important because participation in leisure skill activities has been inversely related to the amount of inappropriate behavior exhibited (Favell, 1973; Schleien, Kiernan, & Wehman, 1981). Another benefit of training leisure skills in developmentally and physically disabled persons, is the possibility that these skills can develop into vocational and career activities (Falvey & Coats, 1989; Wehman, 1978). Moreover, Adkins and Matson (1980), and Johnson and Bailey (1977) have shown that simply supplying the necessary materials is not enough to increase leisure activity participation. It was not until staff members trained the clients in the various activities (e.g., making potholders, weaving) that they began to participate. This finding is significant given that many facilities and programs for developmentally and physically disabled persons boast of having many games and toys, but do not provide instructions in their use.

The various types of leisure skill activities trained to mentally retarded persons include table games (i.e., tic-tac-toe, checkers, Lotto) (Marchant & Wehman, 1979; Wehman, Renzaglia, Berry, Schutz, & Karan, 1978), physical fitness training (i.e., sit-ups, knee push-ups, duck-walking) (Wehman et al., 1978), operation of a stereo (Matson & Marchetti, 1980) and a cassette recorder (Horst, Hill, Wehman, & Bailey, 1981; Wails et al., 1981), Frisbee (Horst et al., 1981), leisure-dance instruction (Lagomarcino, Reid, Ivancic, & Faw, 1984), and arts and crafts (Adkins & Matson,

1980; Johnson & Bailey, 1977). The arts and crafts skill of leatherwork was chosen for this study. To date, no empirical studies have specifically investigated the training of leatherwork as a leisure activity. However, in the two arts and crafts leisure studies mentioned above, instruction in the activities of weaving, making potholders and rugs, was effective in increasing the time mentally retarded persons spent engaged in these leisure activities (Adkins & Matson, 1980; Johnson & Bailey, 1977).

Acquiring leisure skills may be more imperative for persons with visual impairments because most blind persons have more free time than sighted persons (Buell, 1951). As Helen Keller has been quoted, "The curse of the blind is not blindness, but idleness" (Buell, 1973, p.7). However, no studies have been conducted to empirically document the effectiveness of leisure skills training with visually impaired persons. In general, descriptive writings describe some of the hobbies and recreational activities of visually impaired individuals and include: leathercrafts, woodworking, ceramics, cooking, gardening, music, fishing, skiing, bowling, and swimming (Ludwig, Luxton, & Attmore, 1988; Ritter, 1953).

Training Strategies for Independent Living Skills Acquisition

Behavior modification procedures are the most commonly used methods to train new behaviors in developmentally and physically disabled individuals. In fact, entire books have been written on the subject (e.g., Foxx, 1982; Hersen, Van Hasselt, & Matson, 1983; Matson, 1990). Since the 1960s, behavioral treatment procedures to train independent living skills have progressed from isolated, simple procedures based on operant conditioning (e.g., shaping), to more comprehensive treatment packages with social learning components (e.g., independence training). Each treatment component, which is commonly used in training new skills, will be briefly reviewed.

Shaping

Shaping is the differential reinforcement of successive approximations of a target behavior. As a result, shaping may require many small increments, and behavior change may be gradual and erratic (Cooper, Heron, & Heward, 1987). However, it is a useful procedure for training new behaviors that can not be easily learned through verbal or physical prompts (Cooper et al., 1987). For example, if a particular independent living skill is not in an individual's repertoire, (s)he can not be reinforced for performing it. Therefore, the individual is initially reinforced for performing a rough approximation of the desired behavior. As the individual consistently performs the rough approximation, reinforcement is given for performance of a closer approximation of the skill, and so on, until reinforcement is only given for performance of the target behavior.

Prompts

Prompts are external stimuli used to increase appropriate responding. The four basic prompts are: verbal, gestural, modeling, and physical (Taras & Matese, 1990). They can be used singularly, in combination, or arranged in a hierarchy. Examples of various prompt usage to increase performance of a desired skill in increasing order of restrictiveness are: giving a verbal instruction, gesturing of the desired behavior, modeling the skill, and physically moving the individual through the necessary steps.

Graduated Guidance

In graduated, or manual, guidance, training typically begins with the most restrictive physical prompt, and a fading procedure (i.e., shadowing, spatial fading) is used to decrease the amount of physical prompts given to successfully complete the target behavior (Cooper et al., 1987). When shadowing, the trainer keeps his/her hands two to three inches from the client's hand and follows the client's movements, in order to immediately correct any errors or hesitations (Cooper et al., 1987; Taras &

Matese, 1990). The trainer then gradually increases the distance between his/her hands and the client's. Spatial fading consists of gradually moving the physical prompt further away from the client's hands (Cooper et al., 1987; Taras & Matese, 1990). For example, the trainer would first prompt the client by putting his/her hand over the client's hand, then (s)he would move the prompt to the client's wrist, then the forearm, the elbow, and lastly, the shoulder (Cooper et al., 1987; Snell, 1987; Taras & Matese, 1990).

Response Chaining

Following graduated guidance, response chaining is the second major instructional method for teaching independent living skills (Azrin & Foxx, 1971; Watson & Uzzell, 1980). The utilization of response chaining requires task analyzing the skill first, whereby each skill is broken down into a sequence or chain of smaller, teachable steps that are necessary in order to perform the behavior (Cooper et al., 1987; Foxx, 1982; Snell, 1987). The number of steps in any task analysis will vary, depending upon the student's ability level and the complexity of the task. The finalized task analysis is then used to train the target skill through forward or backward chaining.

Forward chaining. In forward chaining, the first step of the task analysis is taught first, and trained to a preset criterion (e.g., five successive correct performances). Once the client meets this criterion, then the second step of the sequence is trained, and reinforcement is given for successfui performance of both the first and second step. As each succeeding step is trained, reinforcement is contingent upon the cumulative performance of all previous steps in the correct sequence.

Backward chaining. Backward chaining is used to train the task analysis steps in reverse order (Cooper et al., 1987; Taras & Matese, 1990). More simply, the last behavior in the chain is taught first, and the first step in the behavioral sequence is

taught last. Initially, all steps of the task analysis would be performed by the trainer, except for the last step, which the client is required to complete. Once (s)he has met the preset criterion for this step, training would begin on the next-to-last step, and reinforcement would be contingent upon correct performance of both the last and next-to-last step. This backward sequence of training would continue until all of the steps in the task analysis are taught and performed cumulatively.

Shaping, prompts, graduated guidance, and response chaining have all been used through the years to successfully train independent living skills to developmentally disabled persons. However, treatment packages, which combine several effective procedures, arose out of a need to improve the teaching of basic independent living skills. In particular, it was noted that many previously trained skills did not generalize or maintain. In response, one treatment package was created that added self-evaiuation and self-monitoring techniques to the familiar empirically established procedures to increase the efficacy of independent living skiiis training. This treatment package is labeied "independence training", because it proports to "train independence" through the use of more naturalistic training techniques (Matson, 1980).

Independence Training

independence training is a treatment package containing the following components: instructions, modeling, shaping, performance feedback, social reinforcement, and self-monitoring and evaluation (Matson, 1981,1982). This method differs somewhat from standard operant procedures, in that social learning principles are employed. Specifically, independence training includes self-evaluation and peer reinforcement. These components were added to the standard behavior modification procedures (e.g., modeling, shaping) to increase generalization and subject motivation by allowing the subject to be more involved in and informed about

their treatment (Matson, 1980). The self-evaluation and peer reinforcement components "train independence" by utilizing training procedures closely approximating behavior that is exhibited in the client's natural environment (Matson, 1980), such as naturalistic social versus tangible reinforcers (Matson, DiLorenzo, & Esveldt-Dawson, 1981). The primary goal of treatment is to increase independent functioning in a typically dependent population (Matson & Marchetti, 1980).

Using independence training, Matson, Marchetti, and Adkins (1980) taught basic showering skills to 25 moderately to profoundly mentally retarded adults. The residents who received independence training completed more showering steps, as compared to the 25 residents receiving standard training, and the 25 controls. Standard training consisted of verbal prompts, modeling, manual guidance, social reinforcement, shaping, fading, and chaining. The procedures utilized in independence training included those used in the standard training group, but with the addition of self-evaluation and monitoring. The self-evaluation and monitoring phase took place at the end of the week, and consisted of asking the residents to evaluate their performance during the previous week. Social reinforcement was given for accurate and honest answers, regardless of performance. If no progress was made during the week, the resident was prompted to give possible reasons why, and suggest ways in which to improve his/her performance. However, if the resident completed more steps than the previous week, social reinforcement was given, along with a small star to place on a progress chart, as a form of public recognition and self-monitoring. After treatment, independence training was found to be superior to standard training procedures and no treatment, and it was the preferred training method of the residential staff.

In a similar study by Matson et al., (1981), independence training was used in a group training format, to teach showering skills to 36 moderately to severely

mentally retarded adults. Training consisted of first having the trainer model, while simultaneously providing verbal instructions, the task-analyzed steps to groups of three residents. Then the residents, one at a time, began their showers; when an error was made, the trainer asked one of the other two residents to verbalize the cues necessary for correct performance. At the end of showering, each resident was asked to evaluate their own performance, and were given feedback from the trainer. Residents who received independence training performed significantly better than controls on posttest measures.

In addition to showering, independence training has been utilized to train many different independent living behaviors to mentally retarded adults, including: pedestrian skills (Matson, 1980), shopping skills (Matson, 1981; Matson & Long, 1986), phone conversation skills (Matson, 1982), wardrobe/nightstand maintenance (Matson, Marchetti, & Adkins, 1980), leisure skills (Matson & Marchetti, 1980), and dining skills (Matson, Ollendick, & Adkins, 1980).

Advantages of independence training are numerous. First, it has been proven to be more effective than a number of conventional behavioral treatments (e.g., modeling) for training a variety of independent living and social skills to persons with mental retardation (Matson, 1980, 1982; Matson & Marchetti, 1980; Matson, Marchetti, & Adkins, 1980). Furthermore, greater maintenance effects have been achieved (Matson, 1982; Matson & Marchetti, 1980). Also, it utilizes small groups, rather than one-to-one training, thus being more efficient by creating a savings in staff time (Matson, Marchetti, & Adkins, 1980; Matson et al., 1981). Additionally, it enhances consent to treatment by increasing feedback to and the responsibility of clients in their treatment programs through self-evaluation and monitoring (Matson & Marchetti, 1980; Matson, Marchetti, & Adkins, 1980). These treatment components also promote increased attending and less off-task behavior by the clients

(Matson & Marchetti, 1980). Finally, both staff members and clients have positively reacted to independence training and seem to find this method socially reinforcing (Matson, 1980; Matson, Marchetti, & Adkins, 1980). Specifically, staff have rated independence training favorably in terms of acceptability and successfulness (Matson et al., 1981). To date, the research indicates that supplementing traditional operant training procedures with self-regulating techniques can facilitate acquisition of independent living skiils. However, it should be cautioned that although this technique is applicable to mildly and moderately mentally retarded persons, it may have less applicability with severely and profoundly mentaliy retarded persons, because of the emphasis on self-evaluation and monitoring.

Up to this point, the data on the efficacy of independence training have been very good. It has been shown to be very effective in training advanced independent living skills to instltutionalized mentally retarded adults. However, there is a paucity of data investigating the use of independence training with different populations, targeting dlfferent behaviors, and conducted in different settings. The purpose of the present study is to document its effectiveness in and across the above mentioned areas.

Purpose

The present study was designed to advance and extend the independent living skills training literature, especially as it pertains to independence training, in a number of ways. First, it will be the first study utilizing independence training to teach various independent iiving skills to a handicapped population other than persons with mental retardation: persons with visual impairments. Studies comparing treatment efficacy across different populations are important because assumptions concerning the applicability of treatment techniques across various populations are frequently made and often may be in error. It is also important to demonstrate that treatment procedures can be used to treat similar behavioral excesses and deficits

across various populations to determine what modifications in procedures, if any, are needed. That is, research is needed to demonstrate that standard treatment techniques are not population specific, and can achieve similar results in different populations. independence training has been shown to be effective in remediating a variety of adaptive behavior deficits of mentally retarded persons, but no studies have been conducted that extend the use of independence training to other handicapped groups. in particular, it is not known whether the sensory restrictions of visually impaired individuals will affect the effectiveness of this treatment package. Therefore, the present study will attempt to illustrate that with a few modifications of some procedures (e.g., physically guiding the person's hands, while providing a narration of the behavioral steps, instead of observing the model), independence training can be used effectively to remediate the adaptive behavior deficits of visually impaired individuals as well.

Secondly, all previous independence training research has been conducted with adults. No research evidence has been presented to indicate that independence training is effective in teaching children independent living skills. With regard to the historical view of childhood psychopathology, one can not assume that children are just "little adults", and that what is effective for adults, will naturally be as effective with children. Although children and mentally retarded adults may have comparable mental age equivalents, other factors, such as physical and social development, may influence training. Therefore, it is important to empirically document what adult behavioral procedures produce comparable results with children, and what, if any, modifications might be necessary. This study will be the first to utilize independence training with children and youth.

Third, behaviors previously taught using independence training typically have been more advanced independent or community living skills (e.g., grocery shopping,

pedestrian skills, phone conversation skills, etc.). While these skills are important, not enough research has been done in training the intermediate independent living skills, such as folding laundry and spreading. In fact, no independence training study has targeted these intermediate domestic skills, or emergency situation skills. Within the realm of leisure skills, there has been only one study conducted, in which stereo use as a leisure activity was taught (Matson & Marchetti, 1980). The current study will attempt to extend the range of behaviors taught using independence training by training intermediate domestic skills, emergency telephone skills, and different leisure skills to promote independence of visually impaired persons.

Fourth, in previous independence training studies, the settings involved were typically state institutions for mentally retarded persons. However, not all clients who present with independent living skills deficits reside in institutions. And because training should be conducted where feasible in normal environments, independence training needs to be evaluated in less restrictive settings, such as homes, schools, and group homes. This study will add to the independence training literature in this fashion by conducting training on a residential school campus.

Fifth, the efficacy of treatment procedures that utilize small groups of handicapped clients, in contrast to individual training, is important to document, because many handicapped clients are placed in schools, centers, or institutions, that cannot provide one-on-one training. Even if such resources are available, rarely is there commitment of sufficient manpower around the clock. Treatment procedures that are effective in small groups would be more realistic, feasible, and cost-effective given limited staff resources (Edwards & Lilly, 1966). Independence training was chosen because of its success in a small group format with developmentally disabled persons. The overall research question is whether the group format of independence

training will be equally effective across different handicapped populations, age ranges (e.g., children and youth), target behaviors, and settings.

METHOD

Subjects

Three independent living skills were taught to each of the three children and four young adults studied in two separate treatment groups. Both groups contained children and young adults with visual impairments: One group was comprised of younger children (1st grade, ages 7-9) (n=3), while the second group was comprised of older youth (high school, ages 19-20) (n=4). All subjects were visually impaired and were residents at the Louisiana School for the Visually Impaired (LSVI) in Baton Rouge, Louisiana. The subjects were selected based on their lack of daily living skills, and the need for additional instruction.

The first grade group contained two boys and one girl. Initially, the first grade group included another child, a ten-year-old black male, who was dropped from the study because he could successfully perform each skill during baseline. Because the child still wished to participate, he was allowed to perform the skills along with the other children, and allowed to provide feedback to the others during training. He also received the same reinforcement. However, due to time limits, he was not videotaped.

The first child was an eight-year-old black male (Bernie), who was classified as blind, with only light perception in the right eye. The etiology of Bernie's blindness was retinopathy of prematurity (he was born 3 months premature, weighing 1 pound, 12 ounces, received 3 months of oxygen therapy, and had a cataract removed). At the time of his last comprehensive assessment (conducted 34 months earlier), when administered the verbal subtests of the Wechsler Preschool and Primary Scale of Intelligence, Bernie was functioning in the borderline range for intellectual functioning. On the Vineland Social Maturity Scale, Bernie had achieved an age equivalent that was commensurate with his chronological age at that time. On a

skills inventory designed specifically for visually impaired children (Oregon Project for Visually Impaired and Blind Preschool Children Skills Inventory), Bernie (who was 5 years, 8 months old at the time of testing) scored at the 3 to 4 year level on cognitive skills, 4 to 5 year level on language, 5 to 6 year level on socialization, 4 to 5 year level on fine motor skills, and 5 to 6 year level on gross motor skills. At that time, when compared to other visually impaired students, Bernie performed below level in all areas except socialization and gross motor skills. Motor screening found Bernie's gross motor skills to be within normal limits, and his fine motor skills to be weak. Bernie's hearing was within normal limits. No medications or additional impairments were noted.

The second boy was a seven-year-old black male (Corey), who met the classification criteria for blindness, with only light perception in the left eye, and vision in the right eye being limited to hand motion at one foot with corrective lenses. The etiological factor was retinopathy of prematurity (he was born prematurely, weighing 1 pound, 7 ounces, and received oxygen therapy for 5 months). Corey's last comprehensive assessment was conducted 18 months earlier. At that time, Corey's cognitive ability was assessed with the cognitive abilities subtests of the Woodcock-Johnson Psycho-Educational Battery. Corey's broad cognitive ability full scale score was in the low average range. On the Vineland Adaptive Behavior Scales, Corey (age 5 years, 6 months at time of testing) scored at the 5 year, 7 month level on communication, the 3 year, 6 month level on daily living skills, the 4 year, 2 month level on socialization, and the 4 year, 1 month level on motor skills. His adaptive behavior composite was at the 4 years, 4 months age equivalent. Corey's performance at that time indicated that he was functioning below average in the areas of daily living skills, socialization, and motor skills when compared to sighted children his own age. When Corey's development was compared to other blind

children on a criterion-referenced developmental scale (Reynell-Zinkin Developmental Scales for Young Visually Handicapped Children), he performed developmentally only slightly below average. The Reynell-Zinkin scales contain six domains. Corey (age 5 years, 9 months at time of testing) performed at the 4 year, 6 month to 5 year level on Social Adaptation, the 4 year to 4 year, 2 month level on Sensori-Motor Understanding, the 4 year, 3 month to 5 year level on Exploration of Environment, the 5 year level on Response to Sound and Verbal Communication, the 5 year level on Vocalization and Expressive Language - Structure, and the 5 year, 3 month level on Expressive Language, Vocabulary and Content. Corey had tubes implanted in his ears six years earlier, and passed the hearing screening test that was conducted two years ago. To assess Corey's motor skills, he was administered the Bruninks-Oseretsky Motor Proficiency Scale, which indicated that Corey's weakest area is fine motor skills. Corey's gross motor skills were also rather weak, but had improved since he was fitted with a corrective (lift) shoe for his right foot, which was 1-1/2 inches shorter than his left. Corey suffered from asthmatic bronchitis, which resulted in a lot of school absences, and had been prescribed Slobib Metaproteren.

The third first grader was a nine-year-old black female (Debbie), whose primary classification was Visually Impaired (Blind), with possible light perception in the right eye only. The etiological factor for her blindness was retinopathy of prematurity (she was born prematurely, weighing 2 pounds, 5 ounces, and was in the hospital for 4 months). Her secondary classification was Mild Mentally Handicapped. Debbie was evaluated approximately 23 months prior, at which time she was administered the verbal subtests of both the Wechsler Intelligence Scale for Children-Revised (WISC-R), and the Wechsler Preschool and Primary Scale of Intelligence (due to her extremely low performance on the WISC-R), and scored

within the moderate mental retardation range on both tests. However, because Debbie differed from the normative group, sociocultural scores (SOMPA) were used, which placed Debbie in the Mild Mentally Handicapped range. To assess Debbie's adaptive behavior, her father and houseparent were interviewed using the Vineland Adaptive Behavior Scales. She (age 7 years, 8 months at the time) scored at the 5 year, 3 month level on communication, the 4 year, 8 month level on daily living skills, and the 5 year, 5 month level on socialization when compared to her sighted peers. Debbie's adaptive behavior composite was equivalent to 5 years, 1 month. When compared to a supplemental norm group of visually impaired students in residential facilities, Debbie scored above average in communication, average in daily living skills, and above average in socialization. However, when similar skills were assessed using the Oregon Project for Visually Impaired and Blind Preschool Children Skills Inventory, Debbie performed below the level of blind children her age (7 years, 8 months) in all areas: 4 to 5 year level on cognitive skills, 3 to 5 year level on language, 3 to 5 year level on self-help skills, 5 to 6 year level on socialization, 3 to 5 year level on fine motor skills, and 5 to 6 year level on gross motor skills. Similarly, when Debbie's development was compared to that of blind children, using the Reynell-Zinkin Developmental Scales for Young Visually Handicapped Children, she exhibited a 2 to 4 year deficit in all areas. Debbie (age 7 years, 8 months at the time of assessment) performed at the following age levels on the six Reynell-Zinkin subscales: 4 year, 6 month to 5 year level on Social Adaptation, 4 year, 3 month to 4 year, 5 month level on Sensori-Motor Understanding, 3 year, 1 month to 3 year, 6 month level on Exploration of Environment, 4 year, 8 month to 4 year, 9 month level on Response to Sound and Verbal Communication, 3 year, 5 month to 3 year, 7 month level on Vocalization and Expressive Language - Structure, and 5 year, 3 month + level on Expressive Language, Vocabulary and Content. Debbie's hearing was found to

be "at risk", with a high frequency, moderate to severe conductive hearing loss in her ieft ear. Debbie's right index finger had a skewed joint, and the distal bone of her fifth finger on her left hand was missing. Additionally, Debbie had a somewhat lower than normal degree of muscle tone. The results of a motor screening stated that Debbie's gross and fine motor skills were "at risk"; she was unabie to perform age appropriate fine and gross motor skills. Debbie received Phenobarbital to control seizures.

The oider group was comprised of all males. The first student was a 20-year-old white male (John) who met the biind classification criteria, with a visual acuity of 10/400 in his right eye, and 5/400 in his left eye. John's visual condition was optic nerve atrophy and nystagmus, the result of chicken pox and encephalitis (i.e., inflammation of the brain) at the age of four years, which was further compiicated by a prior splenectomy (age of 5 months). Additional impairments resulting from the encephalitis included a profound hearing loss in his right ear, and seizure disorder, for which he received Dilantin. Forty-two months prior, John was administered the verbal subtests of the Wechsler Adult Intelligence Scale-Revised, and performed in the borderline to low average range at that time, which was consistent with his previous performance on the Wechsler Intelligence Scale for Children-Revised in 1983, and his overall academic achievement. John's most current comprehensive assessment was conducted 5 months earlier, and included the Vineland Adaptive Behavior Scales. When compared to sighted young adults his own age (20 years, 4 months), John scored at the 8 year, 8 month level on communication, 16 year, 3 month level on daily living skills, and 15 year, 6 month level on socialization. His adaptive behavior composite was at the 13 years, 6 months age equivalent. A screening of John's gross and fine motor skills indicated that they were within

normal limits. John's major interest area appeared to be caring for plants, which is exemplified by his desire to work in a greenhouse upon graduation.

The second youth was a 19-year-old black male (Mark), who was classified as blind with only light perception in both eyes. Mark and his dizygotic twin nonhandicapped brother were born two months premature. Mark was diagnosed as hydrocephalic at one year of age. He had residual vision until he became blind at the age of five years, due to increased fluid pressure associated with hydrocephalus. Consequently, Mark had secondary eye conditions of optic nerve atrophy and nystagmus, and had undergone shunt implantation surgery. Mark also had a history of mild, but infrequent, seizures. The last comprehensive evaluation (conducted 30 months prior) indicated that Mark performed at the low end of the borderline range on the verbal subtests of the Wechsler Intelligence Scale for Children-Revised at that time. Mark, who was 17 years old when administered the Vineland Social Maturity Scale, achieved an age equivalent score of 9 years, 7 months on adaptive behavior skills when compared to nonhandicapped peers. Results of motor screening indicated that Mark experienced difficulty with both fine and gross motor control. A hearing screening found Mark's hearing to be within normal limits. Mark's major areas of interest included music and sports activities (e.g., lifting weights).

Leonard was a 20-year-old white male who met the classification criteria for blindness with a visual acuity of 20/200 in both eyes with corrective lenses, and a diagnosis of optic nerve hypoplasia. Leonard's early medical history was quite remarkable with a history of severe colds with high fever during infancy and early childhood. When Leonard was approximately one year old, a concurrent diagnosis of epilepsy was made, for which Phenobarbital and Dilantin were prescribed and Leonard continued to receive. Also at this time, Leonard had surgery to correct his strabismus (crossed-eyed). As part of the comprehensive evaluation conducted 13

months earlier, Leonard was administered the Visual Efficiency Scale to determine how well Leonard uses his residual vision. Results indicated that Leonard had a mild to moderate degree of difficulty in visual efficiency. On the Wechsler Adult Intelligence Scale-Revised verbal subtests, Leonard performed in the borderline range. When compared to sighted children his own age (18 years, 7 months) on the Vineland Adaptive Behavior Scales, Leonard scored at the 5 year, 11 month level on communication, 7 year, 4 month level on daily living skills, and 9 year, 10 month level on socialization. His adaptive behavior composite of 7 years, 4 months (at the 0.1 percentile) was indicative of severe adaptive behavior deficits. Due to difficulties in motor coordination, Leonard received adapted physical education. Leonard also received speech and language therapy. A hearing screening test concluded that Leonard's hearing was within normal limits for educational purposes. When asked what he liked to do with his free time, Leonard identified watching sports on TV, and doing things with his family.

The fourth high school student was a 20-year-old white male (Lee) who fit the classification criteria for blind, with a visual acuity of 20/200 in his left eye, and finger count in his right eye with correction. The primary cause of his visual impairment was rubella and congenital cataracts. Lee was born two months premature, weighing approximately 3 pounds, and received 2 months of oxygen therapy. A secondary condition of glaucoma was also noted. At the time of his last comprehensive evaluation (32 months prior), Lee (age 17 years, 1 month) was administered the verbal subtests of the Wechsler Adult Intelligence Scale-Revised, and met the classification criteria for Mildly Mentally Handicapped. Adaptive behavior deficits were assessed with the Vineland Social Maturity Scale. When compared to his nonhandicapped peers, Lee (age 17 years, 4 months at that time) achieved an age equivalent score of 8 years, 8 months. The results of the motor

screening concluded that Lee's balance and visual motor skills were very poor. Moreover, Lee is restricted from certain physical activities (e.g., swimming) because of a shunt that was inserted into Lee's eye to help alleviate eye fluid pressure. Lee's hearing was found to be within normal limits. Current medication consisted of eye drops for glaucoma. Lee liked to spend his free time listening to gospel music, going out with his family, and participating In church activities.

Setting

Baseline and treatment sessions for both groups were conducted in the first grade classroom on the campus of the Louisiana School for the Visually Impaired. The school had been operating since 1852, at which time it was the residential school for the blind, the deaf, and the multihandicapped. Currently, 78 students are enrolled, which includes both day and residential students. Training sessions lasted nine weeks, occurred Monday through Thursday, and were conducted from 3:00-4:00 p.m. for the first graders, and from 4:00-5:00 p.m. for the high school youth.

Target Behaviors

Each group was taught a set of three different independent living skills. The first graders were taught emergency (i.e., calling "911") and domestic (i.e., folding a shirt, spreading) skills. These particular skills were selected after a discussion with the first grade teacher about the children's academic goals. All three skills appeared at the 5 year, 6 month developmental level on the self-help domain of the Oregon Project for Visually Impaired and Blind Preschool Children (Brown, Simmons, & Methvin, 1979), indicating that these children should have already acquired these skills. Subsequently, each selected independent living skill was task analyzed, so that the dependent variable was the number of steps of the task analysis successfully completed by the student. The steps did not have to be completed in order to be scored as correct, with the exception of dialing "911". For the dialing step, if

any additional buttons were pushed before, during, or after dialing 9-1-1, then this one step would be scored as incorrect, because the exact sequence of numbers is crucial in this step. The task analyses for the first graders were socially validated by having graduate students, who had experience in teaching independent living skills, and/or the first grade teacher break the task down into the small, measurable steps.

Folding a shirt. The shirt was folded in such a manner that an edge was always used as a guide to assist in alignment. With this in mind, the skill of folding a long-sleeved knit shirt was broken down into the following 11 steps: (1) identify front of shirt, (2) place shirt front side down, (3) straighten out shirt, (4) fold shirt in half (vertical, side to side), (5) match sleeves, (6) align body of shirt, (7) grasp both sleeves, (8) fold sleeves upon themselves, (9) align edge of sleeves with far edge of shirt, (10) fold main body of shirt in half (horizontal, bottom to top), and (11) align bottom edge of shirt with top of shirt. Towards the end of training, a short-sleeved t-shirt was used in the training sessions to help train generalization to other types of shirts.

Calling "911". Using a push-button telephone, calling "911" was broken down into the following 8 steps: (1) pick up receiver; (2) put receiver to ear; (3) push the "9", "1", "1" buttons in sequence*; (4) identify self; (5) give location (e.g., address of the school); (6) describe emergency; (7) concluding phrase; and (8) replace receiver. *Note: If any additional buttons were pressed either before or after dialing the 9-1-1 sequence, then step #3 was scored as incorrect. Several variations were incorporated into the training sessions to aid in generalization, and included utilization of: (a) various hypothetical emergency situations (e.g., fire, fall, poisoning, drowning, choking, etc.), (b) different locations (i.e., school, home), and (c) two different types of telephones (princess style and desk-top model).

Spreading. A variety of materials were used to assist in the generalization of spreading and included different shaped crackers (i.e., square, round), and a choice of a spread (i.e., peanut butter, cream cheese, spreadable cheese). The skill of spreading was taught in 9 steps: (1) grasp spread container with one hand; (2) grasp knife with other hand; (3) angle knife, with flat surface of knife perpendicular to spread, run it across surface of spread; (4) secure spread on flat surface of knife; (5) grasp cracker with other hand; (6) place knife (flat, spreadable side down) on cracker; (7) move knife (spread side down) across cracker; (8) scrape knife clean against edge of cracker; and (9) set knife down.

For the older youth, leisure skills were selected for training after consultation with the school psychologist revealed that, outside of structured recreation activities, these boys did little with their free time. Leatherwork was chosen to be the trained leisure skill, for the following reasons: (a) It could be performed through tactile means, and was not dependent upon vision; (b) it was functional, in that the end products could be used (e.g., belt); (c) it was a typically masculine task that appealed to older males; and (d) it could lead to the development of a vocational skill. Three leatherwork tasks that were likely to be independent of each other were targeted (i.e., coin purse, belt, bolo tie). The leatherwork task analysis contained generic steps, making it applicable for all three leather tasks. The individual steps for each task were not specified, because they differed at different points in task completion. For example, in making the coin purse, inserting the lace in between the two pieces of leather is one of the first steps, but is only performed in the beginning. By making the steps generic, the steps completed could remain consistent throughout all phases of task completion.

Leatherwork. Construction of the coin purse required using a whipstitch to lace two pieces of leather together. The belt was constructed by interconnecting leather

links. The bolo tie consisted of braiding three leather strings and tying a knot at each end. All three leatherwork tasks utilized the following 6 step task analysis: (1) get work out of bag, (2) correctly align pieces for next step, (3) complete one step correctly, (4) complete two steps correctly, (5) complete three steps correctly, and (6) return work materials to bag. What constituted a step differed for each task. For example, for constructing the belt, a step could be defined as connecting one leather link, whereas for the bolo tie, a step could be completing a braiding step (i.e., swapping two strings). Toward the end of training on the coin purse, different tasks (e.g., wallet, key case) were utilized to provide opportunities for generalization of the whipstitch skill to different leather tasks.

Experimental Design

A multiple baseline design across independent living skills was implemented concurrently with the seven subjects (three first graders, and four older youth) (Barlow & Hersen, 1984). Initially, baseline data were collected across the three behaviors for each of the two groups. The second step consisted of implementing treatment for one behavior (i.e., folding, coin purse), while baseline data were continued for the other two behaviors (i.e., calling "911" and spreading, belt and bolo tie). The subjects within each of the two groups were yoked together, therefore treatment began at the same time for all of the subjects within a group. An improvement was defined as 25% (for the first graders) and 50% (for the older youth) of the steps successfully completed, and 100% of the subjects must meet this criteria before treatment began for the next behavior. The criteria differed for the two groups, because of the discrepancy in the length of the respective group's task analyses. However, if all but one of the subjects completed 100% of the steps, and the last subject had not reached the 25% or 50% criteria, then treatment for the next target behavior would occur. This was to prevent delaying treatment for the rest

of the group, when one member did not show treatment gains. Once the subjects met the predetermined criteria for the first behavior, then treatment was applied to the second behavior (i.e., calling "911", belt), while baseline continued for the third behavior (i.e., spreading, bolo tie), and treatment continued for the first behavior (i.e., folding, coin purse). Once the subjects met the criteria on the second behavior, then the third behavior (i.e., spreading, bolo tie) was trained. The dependent variable was the number of task analyzed steps correctly performed without assistance.

Reliability and Rater Training

Reliability data were collected across baseline and treatment sessions by undergraduate psychology students enrolled in independent research, but not involved in providing the treatment. This approach was taken to avoid any possible bias of trainers also serving as raters of treatment progress. In order to keep the raters as blind as possible to the treatment phases, the trials were videotaped, and showed to the raters on a color monitor in a university research room. This prevented the raters from knowing when treatment was being implemented on any behaviors.

The independent raters were pretrained on rating these independent living skills, and attained 93% reliability on rating the emergency and domestic skills of the first graders, 90% reliability when rating the leisure skills of the high school youth, and an overall reliability of 92% for all behaviors.

Reliability was calculated according to percent agreement (agreements divided by agreements plus disagreements, then multiplied by 100) of the number of steps successfully completed in each baseline and treatment session. An agreement was scored when both raters agreed upon an occurrence; nonoccurrence intervals were not included in the reliability estimate. This is the most common method of computing reliability. Reliability estimates of baseline sessions for the first graders

were collected for 62% of baseline sessions for Corey and Debbie, and 72% for Bernie, and a total of 64% of baseline sessions for the three first graders. For treatment sessions, reliability estimates were 51% for Corey and 67% for Bernie and Debbie, with a total of 63% of the first graders' treatment sessions. Percentage of reliability estimates of total sessions for the first graders ranged from 60% of total sessions for Corey to 65% for Bernie and Debbie, and a total of 64% of the total sessions for all three first graders. For the baseline sessions for the high school youth, collection of reliability estimates ranged from 43% of baseline sessions for Leonard to 71% for John, with a total of 60% of baseline sessions for the older youth. Reliability estimates of treatment sessions ranged from 57% for Leonard to 76% for Lee, with a total of 65% of the treatment sessions. For the high school youth, percentage of total sessions in which reliability data were collected ranged from 52% for Leonard to 69% for John and Lee, and a total of 63% of the total sessions for all four high school youth.

Baseline

For baseline, subjects were provided with the materials necessary to complete the task (e.g., knife, spread, and cracker for spreading) and asked by the trainer to independently perform the task. All subjects within the groups were randomly selected to perform the task. However, if time did not permit every subject to perform the task at that session, then at the beginning of the next session, those subjects would be allowed to perform that skill first. Trials were videotaped, and the number of task analyzed steps correctly performed without assistance was recorded by independent raters. Baseline sessions continued until a stable, or descending, rate of responding was achieved with no fewer than three baseline data points. Any inappropriate behavior (e.g., eye pressing, head droop) exhibited by the first

graders was controlled by momentary Differential Reinforcement of Other Behavior (DRO).

Treatment

As with baseline, the necessary materials (e.g., telephone for calling "911", leather pieces and lace for making a coin purse) were provided. Training always utilized a small group format of two to four subjects, who were randomly selected to perform each task, so that the same subject did not always go first. The treatment protocol was modeled after independence training procedures utilized by Matson (1980). In the first step, the trainer modeled the steps necessary for successful completion of the task, while she simultaneously provided verbal instructions on how to perform each step. Because the subjects were visually impaired, modeling consisted of taking the subject's hands and physically guiding him/her through all of the necessary steps, while giving verbal instructions. For example, for folding a shirt, the child was manually guided through each step by the trainer, while the trainer described each step, such as, "First, you find the front of the shirt, then you flip the shirt over. Next, you straighten out the shirt, then you bring the corner over to fold it in half," etc. Following modeling by the trainer, the subject was asked to perform the task, while the remaining subjects listened. The trainer described how the selected subject progressed through the task, so that the other subjects could provide corrective feedback to the selected peer. When the trainer noticed an error in the subject's performance, she stopped him/her, described the last successfully completed step and asked one of the subject's peers to verbalize the correct behavior that was required to successfully complete the current step (Matson et al., 1981). For example, if in spreading, the subject did not turn the knife over so that the spread side was facing down (step #6), the trainer would stop the subject, and ask a peer, "What do you do after you get cheese on your knife?". If the correct feedback

was not given by a peer, the trainer verbally prompted the subject (e.g., "You turn the knife over."). If the performing subject failed to respond correctly to either the peer's and/or trainer's verbal prompt, the trainer provided manual prompts, using the least amount of physical guidance necessary for the subject to successfully perform the step. After the step was performed, all prompts were removed, and the child attempted to perform the remainder of the steps in the task analysis. If another error was made on another step, then the above procedure was repeated. A limit of two such cues were allowed per child during each session, due to time constraints. If three or more errors were committed, the trainer manually guided the child through the remainder of the steps.

After the subject completed all of the steps, the trainer asked the subject to evaluate his/her performance on a scale of 1 to 3 (1=not so good, 2=good, 3=very good) (Matson, 1981; 1982) and to give a reason why a particular rating was chosen (Matson, 1981). Verbal prompts were used, when necessary, in order to elicit a response. Following the subject's self-evaluation, the trainer provided feedback on the subject's performance, and provided feedback about the accuracy of self-evaluations. Feedback and reinforcement were based on the number of correctly performed steps relative to previous trials, and the amount of prompting required. Other subjects who observed the performing subject, were asked to evaluate his/her performance and make positive statements about the target behaviors exhibited. Additionally, the performances of the first graders were recorded on index cards, in the following manner: An "X" indicated no improvement; one raised fuzzy sticker for good performance; or two raised fuzzy stickers for very good performance (Matson, 1981). The teacher looked at the cards the next morning and praised the children for good and very good performances (Matson, 1981). As a result, the first graders received social reinforcement from their teacher and peers. No comments were made

regarding Xs. The older youth only received social reinforcement (e.g., "You did a realiy nice job on your belt", "That was good work"). After the subject received his/her feedback and/or stickers, the subject was asked to perform the task without any assistance. The subject's performance was videotaped, so that the raters could record the number of steps correctly performed by the subject. This completed the training of one subject. All of the above steps were repeated for each subject. As in baseline sessions, if all the subjects were unable to perform the task during that session, then the next session continued with those subjects.

With the older youth the independence training procedure was abbreviated once the boys achieved perfect performance. Task performance was maintained by self-evaluation, performance feedback, and social reinforcement by peers and trainer.

In order to maintain the subjects' motivation, attendance was reinforced. For the first graders this consisted of providing edibles (e.g., gumballs, popcorn, juice) after each session, regardless of performance during the session. With the older boys, every second session attended was reinforced with a soda or candy bar.

Social Validation

Treatment outcome is usually evaluated based on quantitative differences in the dependent variable from pre- to posttreatment assessment. However, this manner of evaluation may not adequately address the issue of clinical significance or importance of changes. Social validation provides a way to evaluate the practical, qualitative effects of treatment, as they reiate to the client's everyday functioning. To evaluate the clinical importance of treatment-induced change, systematic criteria are needed (Kazdin, 1982).

Therefore, additional measures of treatment outcome, social validation measures, were utilized to evaluate the clinical significance, or importance, of the subsequent changes in behavior (Kazdin, 1982). Although the importance of

obtaining socially significant behavioral changes has been professed (Kazdin, 1977), rarely have studies included measures of social validity (e.g., Matson et al., 1981; O'Brien & Azrin, 1972). Therefore, acceptability and perceived success of independence training to teach independent living skills, and the importance of these skills were subjectively rated by the first grade teacher in the case of the first graders, and the school psychologist for the older youth (Kazdin, 1977, 1980, 1982). Six ratings were made using a 5-point Likert-type scale, with the positive direction of the scale varying to prevent a particular response set (Appendix A). Ratings were collected at the end of training.

A second social validation measure consisted of having "blind" undergraduate psychology students rate videotapes of each child before and after treatment using a 5-point Likert-type rating of performance of the independent living skills. The order of the behaviors and the subjects were randomized, and the pre- and postsessions were counter-balanced. Although these subjective evaluations may not accurately reflect behavioral change, they are important, because they are often representative of the evaluations the individual would receive in the natural environment (Kazdin, 1980).

An additional anecdotal social validation measure was obtained for one student (John). Over spring vacation John took a leather task (wallet) home with him. At a later date, the trainer called John's mother to informally assess whether John worked on the wallet during his free time, and to obtain her perception of the importance of training leatherwork as a leisure skill, and if she viewed that the current study was successful in achieving that goal.

RESULTS

Acquisition of Independent Living Skills

Reliability data were obtained for 64% of all sessions for the first graders. Reliabilities for Bernie for the three independent living skills were 95% (folding), 99% (calling "911"), and 91% (spreading); Bernie's total reliability was 95%. For Corey, reliabilities for the three target behaviors were 88% (folding), 99% (calling "911"), and 94% (spreading); Corey's total reliability was 92%. Reliabilities for Debbie for the three trained independent living skills were 84% (folding), 98% (calling "911"), and 86% (spreading); Debbie's total reliability was 89%. Total reliabilities for the three behaviors (across subjects) were 89% (folding), 99% (calling "911"), and 90% (spreading). Overall reliability (across behaviors) for all of the three first graders was 92%.

The effects of independence training on the acquisition of emergency and domestic skills in the first graders are represented in Figure 1. Mardi Gras vacation (10 days without training) and spring vacation (12 days without training) are represented by wide arrows. Prior to the implementation of independence training, none of the first graders were able to complete the three target behaviors. Under baseline conditions, the average number of steps completed across the three children were as follows: 1.5 steps (14%) of the 11-step folding task analysis, 3.7 steps (46%) of the 8-step calling "911" task analysis, and 3.9 steps (43%) of the 9-step spreading task analysis. Upon implementation of independence training, increased responding was noted for all subjects across all three target behaviors. For example, the mean number of completed steps for folding a shirt jumped from 1.5 during baseline, to 8.7 during the treatment phase. This is more than a five fold increase. One first grader (Bernie) completed all of the 11 steps of the task analysis for

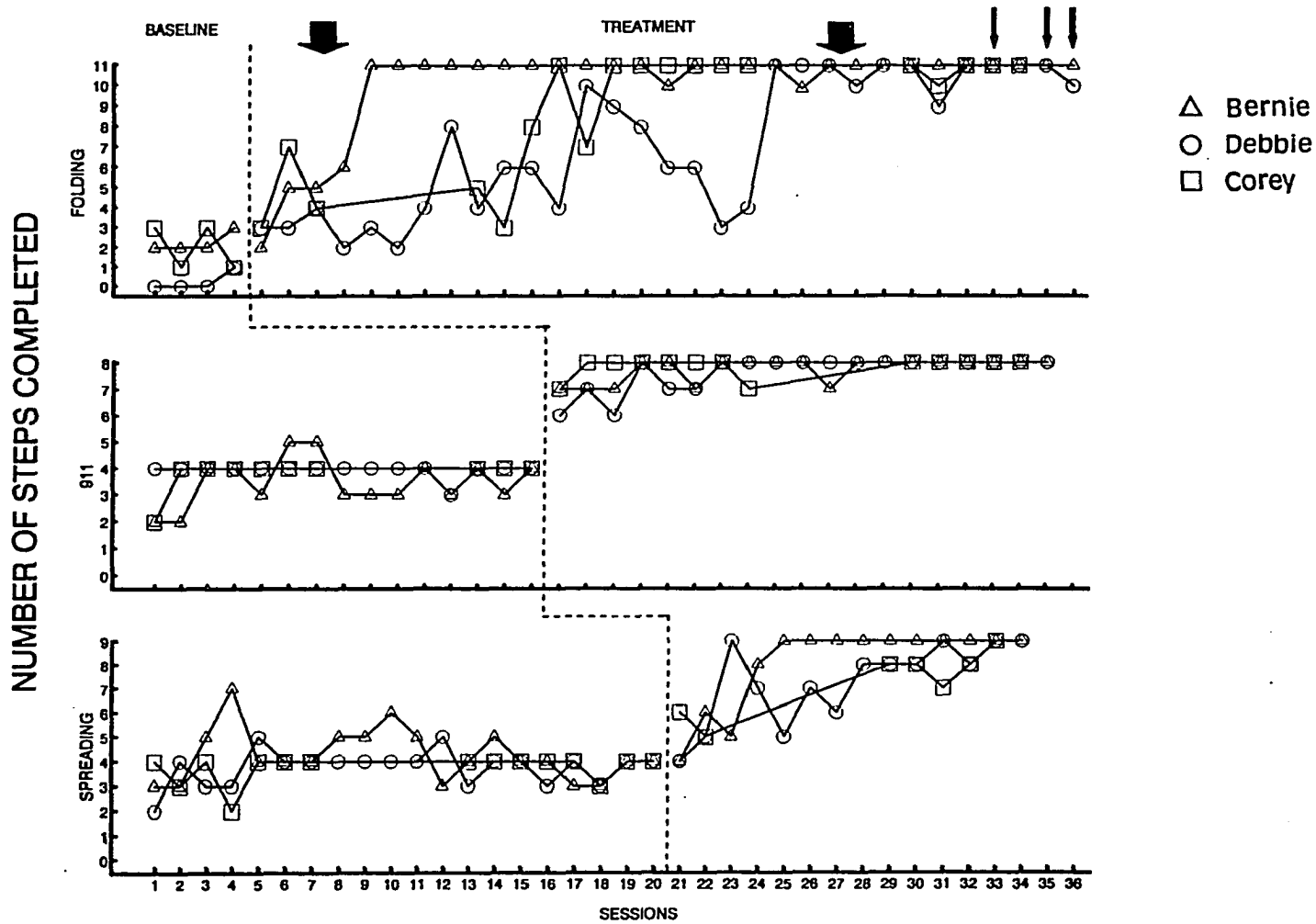

Figure 1. Number of Task-Analyzed Steps Successfully Completed Across Baseline and Treatment Sessions for Three Visually Impaired First Graders

folding after only four training sessions. Debbie's performance for folding the shirt was much more variable. However, given that she was the only one of the three first graders with a concurrent diagnosis of mental retardation, the variability and greater number of sessions required to attain the skill were not surprising. The small arrows at sessions #32, 34, and 35 indicate training on a different shirt (short-sieeved t-shirt). All of the first graders were able to continue to complete all the steps for folding, even with the new shirt.

Improvements following training were also obtained with the second and third target behaviors (i.e., calling "911", spreading), although they were not as large due to the higher rates of baseline performance and shorter task analyses for these behaviors. Nevertheless, beginning with the first training session for calling "911", each child was able to perform 2 to 3 additional steps over baseline, with the mean number of completed steps for training sessions rising four steps above the baseline mean (i.e., from 3.7 to 7.7). After 13 training sessions, all children were able to consistently complete the entire 8-step task analysis. The quicker treatment gains associated with calling "911" probably reflect the emphasis on verbal responses, as opposed to motor responses as is required in folding and spreading, especially in view of the fact that all the first graders have weak fine motor skills. A princess style telephone was used for the first 7 sessions, and for session #33. The remainder of the sessions were conducted with a desk-top telephone. The small arrows at sessions #31 and 32 indicate that the children were required to give their home address as the location of the emergency, rather than the school address.

The pattern of treatment gains for spreading is similar to that of folding, in that improvements were gradual, with Bernie performing 100% of the steps after just four training sessions, and Debbie acquiring the skill after a more lengthy and variable training path. Introduction of training also produced an increase in the mean

number of successfully completed steps of the spreading task analysis (i.e., from 3.9 to 7.6). An interesting event occurred during the training of spreading. After two training sessions, one child (Corey) did not receive any further training on spreading for three weeks, due to illness (asthma) and spring vacation. Upon his return, he not only maintained his previous level of spreading, but showed a three step improvement. In general, performance gains following independence training were gradual and variable for folding the shirt and spreading. However, training on dialing "911" produced immediate and stable gains. This discrepancy may reflect the different emphasis on motor and verbal responses between the domestic and emergency skills.

With regard to the high school youth, reliability data were obtained for 63% of the total sessions. Reliability data for John for his three target behaviors were 100% (coin purse), 100% (belt), and 95% (bolo tie), with a total reliability of 99%. For Mark, the reliabilities for his three leisure activities were 88% (coin purse), 97% (belt), and 100% (bolo tie); total reliability for Mark was 95%. Reliabilities for Leonard's three leisure skills were 96% (coin purse), 95% (belt), and 100% (bolo tie); Leonard's total reliability was 97%. Reliabilities for Lee for his three target behaviors were 98% (coin purse), 98% (belt), and 93% (bolo tie), with a total reliability for Lee of 97%. Total reliabilities for the three behaviors (across subjects) were 97% (coin purse), 98% (belt), and 97% (bolo tie). Overall reliability for all of the four high school youth (across behaviors) was 97%.

The effects of independence training on the acquisition of leisure skills in the high school youth are presented in Figure 2. The wide arrows represent Mardi Gras vacation (no training for 10 days) and spring vacation (12 days without training). During baseline conditions, ail four boys were able to perform only two steps of the target behaviors: taking out, and putting away the necessary materials. The

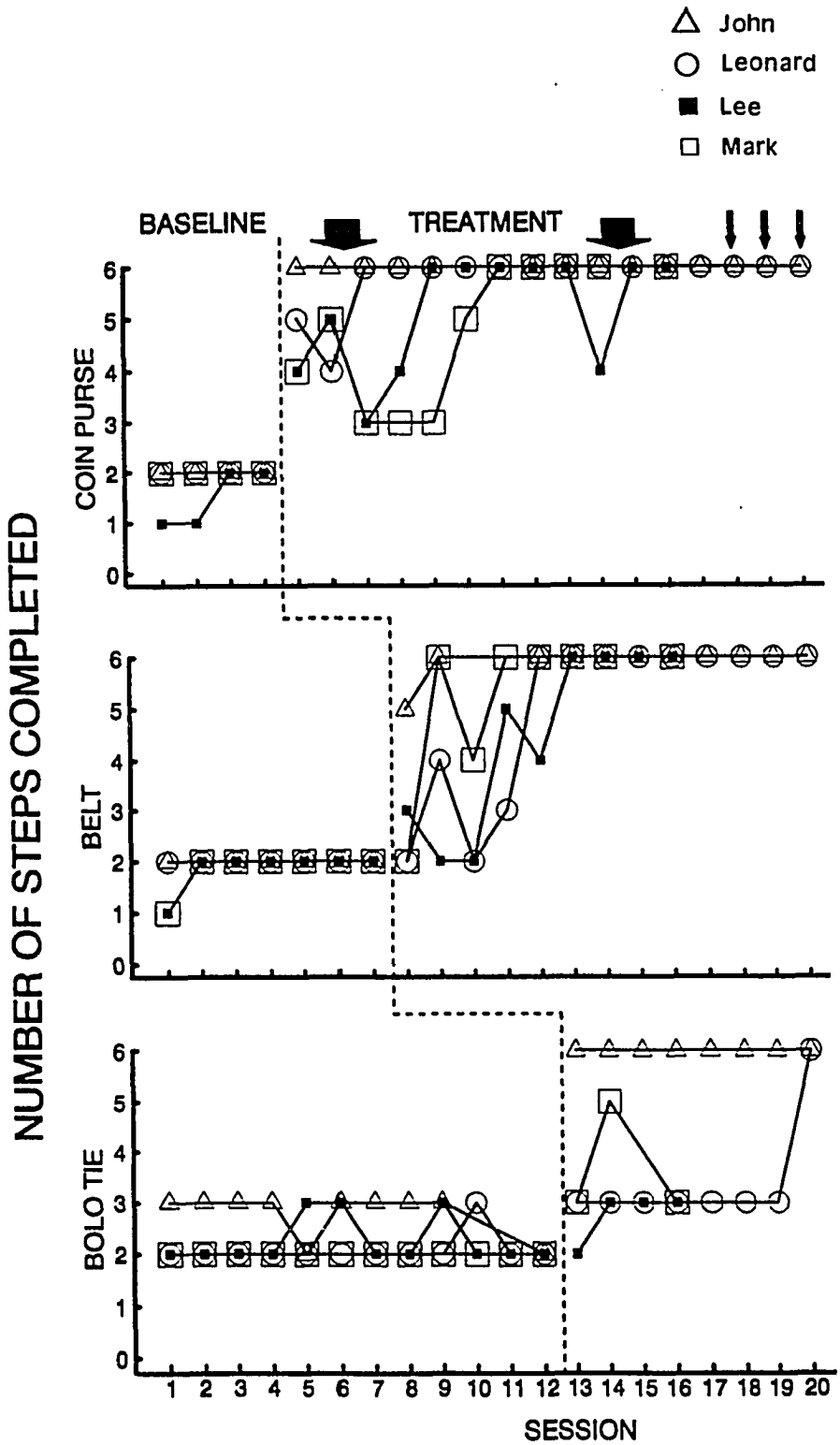

Figure 2. Number of Task-Analyzed Steps Successfully Completed Across Baseline and Treatment Sessions for Four Visually Impaired Youth

exception being the third behavior (bolo tie), for which an additional step (i.e., correctly aligning the material) was performed. Averaging across the four youth, the number of steps completed of the 6-step leatherwork task analyses were as follows: 1.9 steps (32%) on both the coin purse and belt, and 2.3 steps (38%) on the bolo tie. Only after the implementation of independence training did the number of steps correctly performed across all three leatherwork tasks increase, with greater gains, as a group, being made on the coin purse and belt, than on the bolo tie. For example, the number of steps completed during the coin purse training sessions always exceeded baseline performance, with a mean training gain of 3.6 steps (i.e., from 1.9 to 5.5 steps after training). Similarly, following implementation of training on the belt, the mean number of steps completed rose from 1.9 to 5.2, with the number of training sessions needed to acquire this skill ranging from 1 to 5. Although group performance on the bolo tie improved from an average of 2.3 to 4.2 steps, only two students (John and Leonard) were able to complete the entire 6-step task analysis. This was due to the fact that at the beginning of training on the bolo tie, 3 of the 4 boys were unable to tie a knot, which prevented them from performing any further steps of the task analysis. However, after 7 training sessions a new method to train tying a knot was implemented and was immediately successful with Leonard. Therefore, it was felt that if Lee and Mark were to continue training, they too would be able to successfully complete the task analysis for the bolo tie. The small arrows above coin purse training sessions #18-20 indicate that different leather tasks (e.g., wallet, key case) were presented to John. In the case of Leonard, a wallet was trained in session #19. In general, the three leather tasks relied heavily on fine motor skills, which may explain the overall superior performance of John, who was the only boy in this older group who did not exhibit poor motor skills.

The multiple baselines for the two treatment groups show that target behavior performance improves only after implementation of independence training. Therefore, the training gains can be attributed to the training package.

Social Validation of Treatment Gains

At the end of training, the first grade teacher completed the first social validation measure (Appendix) for the three first graders. One form was completed for each of the three independent living skills (i.e., folding, calling "911", spreading) per child. For the high school youth, only one form was completed for each youth, because the leatherwork skills did not vary enough to warrant separate ratings. Therefore, the high school youth were rated on acquisition of leatherwork leisure skills as a whole. These ratings were conducted by the school psychologist, who had weekly contact with the youth, and who had observed them working on their leather tasks on several occasions. Before the mean ratings could be calculated, the scoring direction for questions #3, 4, and 6 were reversed, so that all questions ranged from the lowest rating of "1" to the highest, and most favorable, rating of "5". The various means are represented in Tables 1, 2, and 3. From Table 1, it is interesting to note that question #3, which rates improvement in the subject's ability to perform the target skill, was rated the highest overall (4.94) (across all the subjects and all the skills). Moreover, of all the first graders' ratings, the highest rating (5.00) was received on skill improvement (question #3), with all the children being perceived by their teacher as having "improved significantly" (Table 2). Debbie, in particular, received the highest overall mean rating (4.39), which is probably indicative of the fact that acquiring independent living skills was more imperative for Debbie than the other two boys, because she displayed the largest adaptive behavior deficits. The target behavior rated most favorably overall was "Calling 9-1-1" (4.45) (Table 1). Of the three target behaviors for the first

Table 1. Mean Social Validity Scores on a Five-Point Scale Across Target Behaviors

	FIRST GRADERS			OLDER YOUTH	OVERALL
QUESTIONS	Folding	911	Spreading	Leatherwork	MEAN
1	4.33	4.67	4.00	4.25	4.32
2	4.00	4.00	4.00	4.00	4.00
3	5.00	5.00	5.00	4.75	4.94
4	4.00	4.67	4.00	3.75	4.11
5	4.00	4.33	4.00	4.00	4.08
6	4.00	4.00	4.00	4.25	4.06
MEAN	4.22	4.45	4.17	4.17	4.25

Table 2. Mean Social Validity Scores on a Five-Point Scale Across First Graders

	FIRST GRADERS			OVERALL
QUESTIONS	Bernie	Debbie	Corey	MEAN
1	4.33	4.67	4.00	4.33
2	4.00	4.00	4.00	4.00
3	5.00	5.00	5.00	5.00
4	4.33	4.33	4.00	4.22
5	4.00	4.33	4.00	4.11
6	4.00	4.00	4.00	4.00
MEAN	4.28	4.39	4.17	4.28

graders, Bernie and Corey received the highest ratings (4.5 and 4.67, respectively) on "Calling 911" (Table 3). Thus it appears that emergency survival skills may be considered a training priority.

For the second social validation measure, 15 outside observers (i.e., undergraduate psychology students) rated videotapes of 32 counterbalanced pre- and posttraining sessions, with behaviors and subjects arranged in a randomized order. Eighteen of the scenes featured first graders (i.e., pre- and posttest measures of three behaviors across three children). The older group contributed the remaining 14 scenes (i.e., pre- and posttest measures for four bolo ties, two coin purses, and one belt). Posttest measures could not be obtained on the belt skill for Leonard, Mark, and Lee, because a second similar belt was not available. In addition, posttest measures were not obtained for the coin purse for Mark and Lee due to missed sessions. Therefore, these five scenes were not included in this measure of social validation. The 5-point Likert-type rating scale for the question "How does this student perform the specific skill?" consisted of 1-very poorly, 2-not good, 3-okay, 4-good, and 5-extremely well. A one-tailed Wilcoxon matched-pairs signed-ranked test (Siegel, 1956) was computed on the pre- and posttest pairs. The results showed that at an alpha level of .01, posttest sessions were rated higher than pretest sessions for the first graders, the older boys, and both groups as a whole.

A third, informal social validation procedure consisted of asking John's mother general questions concerning John's leisure skills. The first question was, "What does John do with his free time when at home?". Her reply was that John liked to work in the yard and take care of plants. If he was indoors, then he would watch TV. Secondly, in response to the question of how much time did John spend working on his leatherwork over spring vacation, it was reported that he would go to his room and spend several hours on it, and that he seemed to really enjoy it. Finally, when John's

Table 3. Overall Mean Social Validity Scores on a Five-Point Scale for Target Behaviors Across Subjects

	1ST GRADERS			OLDER YOUTH			
BEHAVIORS	Bernie	Debbie	Corey	Leonard	John	Mark	Lee
Folding	4.17	4.33	4.17				
911	4.50	4.17	4.67				
Spreading	4.17	4.17	4.17				
Leatherwork				4.17	4.50	4.00	4.00

mother was asked if she felt that leisure skills were important for John to learn, she rated leisure skills as a "very important" skill for John to acquire, and felt that it was good that he was learning to do something. She concluded, "Before he would sit at home and wait for me to do something." The anecdotal report received from John's mother showed that John was able to independently engage in a leisure activity in other settings, other than the training environment, and that it was not just the attention he received during training sessions that maintained the skill.

DISCUSSION

The results demonstrate the effectiveness of independence training in increasing independent living skills in visually impaired children and young adults. In addition to varying degrees of visual impairment, the seven subjects had additional impairments (e.g., hearing impairment, mental retardation, motor coordination problems) and/or medical concerns (seizure disorder, hydrocephalus, glaucoma). The ability of independence training to achieve training gains across all members of this extremely heterogeneous group, speaks of its power.

The acquisition of the selected domestic, emergency, and leisure skills is similar to the attainment of related adaptive behaviors in other studies, which utilize various components of independence training with persons with mental retardation (Adkins & Matson, 1980; Risley & Cuvo, 1980; Stewart et al., 1985; Walls et al., 1981). However, the results of the present study extend this research by using independence training to teach various independent living skills to visually impaired students of two different age groups, and conducting the training on a residential school campus. Individuals with visual impairment are often neglected in the self-help skills literature. The vast majority of the adaptive behavior training studies have been conducted with mentally retarded persons, including the independence training research (Matson, 1981, 1982; Matson et al., 1981; Matson & Marchetti, 1980; Matson, Marchetti, & Adkins, 1980).

The present study shows that, with modifications, established training procedures such as independence training, can be effective in training skills to persons with visual impairments. For example, the modeling component was modified for use with visually impaired persons. In this study and others (Sisson, Kilwein, & Van Hasselt, 1988), manual guidance along with verbal narration was

incorporated as a modified modeling procedure. That is, the trainer physically guides the visually impaired person through each of the steps, while verbally describing each action. In fact, a play-by-play description is recommended when teaching independent living skills to visually impaired children, because they gain a lot of useful information that way and learn the routine (Scott et al., 1977).

Similarly, the results of the present study demonstrate that independence training can be used effectively with children and youth. Prior independence training studies have targeted adults exclusively (Matson, 1981, 1982; Matson et al., 1981; Matson & Marchetti, 1980; Matson, Marchetti, & Adkins, 1980). In fact, of the two age groups studied, the younger group (ages 7-10) was more enthusiastic, and had a better attendance rate. They seemed to enjoy the performance feedback component especially, and would even ask themselves how they thought they did during the manual guidance and assessment phases. At times when it was necessary to ask a peer to provide corrective instructions, they were quick to respond, and often talked at the same time, trying to be the one to tell his/her peer how to proceed. Peer reinforcement also began to occur unprompted.

In addition to the focus on mentally retarded adults, the majority of independence training studies have tended to target the more advanced adaptive behaviors, such as shopping skills (Matson, 1981; Matson & Long, 1986), pedestrian skills (Matson, 1980), advanced dining skills (Matson, Ollendick, & Adkins, 1980), and phone conversation skills (Matson, 1982). The acquisition of the current target behaviors by means of independence training extends the types of skills trained with this method, to include more intermediate independent living skills such as, folding a shirt, spreading with a knife, making emergency telephone calls, and leatherwork as a leisure skill.

Prior implementations of independence training have typically occurred in large institutions. The current setting of a residential school campus extends the settings where independence training can be effectively incorporated as part of an everyday routine.

There also appears to be benefits to the group instruction aspect of independence training, in that the students are provided additional training exposure time (e.g., repetition of verbal instructions). This differs from the majority of studies in which adaptive behaviors are taught in a one-on-one situation. With the group format utilized by independence training, the learning of the required steps involved in the task is aided by hearing other students receive training instructions and performance feedback, and by having peers be responsible for giving corrective feedback. In addition, the opportunity for vicarious learning is present. For instance, when training emergency telephone use, the first graders often exhibited training gains by imitating the correct responses of their peers.

In addition to interpreting the quantitative differences between baseline and treatment, the clinical significance, or quality of the subsequent changes were evaluated through three different social validation procedures. The first procedure had individuals who had contact with the subjects rate perceived behavior change. The second ratings were more representative of how the subjects' skill performance would be judged by members of the community. Finally, some anecdotal information was obtained from a parent's observation conducted in a natural environment. All three measures of social validity confirmed that clinically significant changes occurred as the result of treatment, and that the targeted behaviors were important skills for these children and youth to obtain.

Limitations of the present study include the lack of assessment of generalization. The absence of generalization probes during the baseline phase of the study precluded

the formal assessment of generalization of training effects. However, attempts were made to minimize the discriminative properties of the original training stimuli, by incorporating different stimuli into the training sessions.

Another limitation is the absence of training sessions conducted in the environment where the behavior would naturally occur (e.g., spreading was not trained or assessed in a kitchen). However, in the case of emergency phone calls, it is not feasible to provide training in the midst of an emergency. Training is always provided in an artificial environment. In these cases, efforts should be made to modify the environment so that it resembles the natural environment as much as possible.

Finally, the range of the targeted leisure skills was limited to leatherwork. While this is a viable leisure activity, not every client will enjoy it, or have the fine motor coordination to become independent with it. A variety of leisure skills may increase the odds of finding an activity that is rewarding to everyone.

Directions for future research include expanding further on the above literature extension points. That is, independence training should be researched with additional groups with different impairments (e.g., persons with hearing impairments, cerebral palsy), and any modifications should be noted. For example, is independence training as effective with hearing impaired individuals, or do the communication difficulties preclude the use of such a verbal treatment procedure? Can similar results be obtained through the use of sign language, and is it the only necessary modification? Could pictorial cues replace verbal feedback? In reference to a point made previously, demonstrated treatment effectiveness in one impaired population does not necessarily guarantee similar results in others.

More studies employing independence training with children are needed. Although the present study extends the age of persons with which independence

training has been shown to be effective, many age ranges still need to be assessed (e.g., adolescents). For instance, how young can the children be before they begin to experience difficulty with the verbal demands of the procedure.

In general, more empirical work needs to be conducted with visually impaired individuals. It is surprising that so few studies have targeted visually impaired persons, especially because it has been shown that in order to learn many of the things that sighted persons acquire through incidental or vicarious learning, the visually impaired person must be actively taught these things. As a result, a lot more time and exposure to direct teaching methods is required. However, there has not been a corresponding increase in training of visually impaired individuals. More empirical work needs to be conducted to learn how best to teach visually impaired persons to be as independent as possible. This present study is a step in that direction.

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APPENDIX

Social Validation Questionnaire

1. in relation to this child's ability to function independently, I consider (self-help) behavior to be:

1	2	3	4	5
Not Important At All	Not Really Important	Helpful, But Not Important	Important	Very Important

2. The methods used to train (self-help) were:

1	2	3	4	5
Highly Unacceptable	Unacceptable	Okay	Acceptable	Very Acceptable

3. Since the study began, this child's (self-help) behavior has:

1	2	3	4	5
Improved Significantly	Improved Slightly	Not Changed	Become a Little Worse	Become Worse

4. The targeting of self-help skills was:

1	2	3	4	5
An Important Area for Intervention	A Good Area for Intervention	Okay	A Poor Area for Intervention	Not an Important Area for Intervention

5. Compared to prior methods used to accomplish these same behaviors, Independence Training was:

1	2	3	4	5
Much Better	Better	The Same	Worse	Much Worse

6. The change in this child's self-help skills was:

1	2	3	4	5
Zero	Very Little	Some	Good	Great

VITA

Marie E. Taras was born on January 26, 1961 In Dearborn, Michigan. She attended the University of Michigan, where she received her Bachelor of Science degree in Psychology and Biology in 1984. Upon graduation , Marie attended the University of Colorado at Colorado Springs and received her Master of Arts degree in Psychology (Clinical) in 1987. After which, she attended Louisiana State University, where she majored in Clinical Psychology and minored in Special Education. Marie completed her Predoctoral Internship (APA Approved) in Applied Behavior Analysis, Developmental Disabilities, and Behavioral Pediatrics at the Kennedy Institute and the Johns Hopkins University School of Medicine, Department of Pediatrics, Baltimore, Maryland in June, 1991. Marie plans to receive her Doctor of Philosophy degree in Psychology in December, 1992. Marie's professional interests include developmental disabilities, autism, mental retardation, physical and sensory disabilities, and applied behavior analysis. She has published a book chapter and several journal articles on the remediation of behavioral excesses and deficits in persons with developmental disabilities. Her professional memberships include the American Psychological Association, Association for Advancement of Behavior Therapy, Association for Behavior Analysis, Council for Exceptional Children and the International Association for the Right to Effective Treatment. Presently, Marie is the Director of the Autism Support Center in Danvers, Massachusetts.

DOCTORAL EXAMINATION AND DISSERTATION REPORT

Candidate: Marie Elaine Taras

Major Field: Psychology

Title of Dissertation: Using Independence Training to Teach Independent Living Skills to Visually Impaired Children and Youth

Approved:

Major Professor and Chairman

Dean of the Graduate School

EXAMINING COMMITTEE:

Date of Examination:

May 14, 1990